

# PRACTICAL CENTRE

B-14, Block# 1, Gulshan-e-Iqbal, Karachi. Phone: 34976530-34812547-34984762

**Comprehensive Examination - 2023**

According to the syllabus & new pattern of the Board of Intermediate Education, Karachi.

## CHEMISTRY (XII)

Max. Marks: 85

Time: 3 Hours

### SECTION 'A' MULTIPLE CHOICE QUESTIONS (MCQs) (MARKS-17)

Note: (i) Attempt all the questions (ii) Do not copy the questions. Write only the answers on OMR sheet.

(iii) Each question carries ONE mark.

Q. 1 Choose the correct answer for each from the given options:

- (i) The elements of a same group in the periodic table having:
  - (a) same atomic numbers
  - (b) same mass numbers
  - (c) same number of neutrons
  - (d) same valence shell configuration
- (ii)  $\text{CH}_3\text{OH}_{(g)} + \text{H}_2\text{O}_{(g)} \xrightarrow{250^\circ\text{C}} 3\text{H}_2 + \text{A}$ . In the given reaction, "A" is:
  - (a) C
  - (b) CO
  - (c)  $\text{CO}_2$
  - (d)  $\text{CO}_3$
- (iii)  $\text{NaBH}_4$  is an example of:
  - (a) Ionic hydrides
  - (b) Covalent hydrides
  - (c) Complex hydrides
  - (d) Metallic hydrides.
- (iv) When Lithium burn in air it forms Lithium:  $\text{Li} + \text{O}_2 \rightarrow \text{Li}_2\text{O}$ 
  - (a) Normal oxide
  - (b) Peroxide
  - (c) Super oxide
  - (d) Hydroxide
- (v) The H-S-H bond angle in  $\text{H}_2\text{S}$  is:
  - (a)  $92.2^\circ$
  - (b)  $92.3^\circ$
  - (c)  $92.4^\circ$
  - (d)  $92.5^\circ$
- (vi) Aluminium is less reactive towards concentrated:
  - (a) Nitric acid
  - (b) Sulphuric acid
  - (c) Acetic acid
  - (d) Phosphoric acid
- (vii) The coordination number of Chromium in  $[\text{Cr}(\text{S}_2\text{O}_3)_3]^{-3}$  is:
  - (a) 2
  - (b) 3
  - (c) 5
  - (d) 6
- (viii) Zinc is a transition element, but it does not show variable oxidation state because:
  - (a) It does not form coloured compound
  - (b) It has incomplete d-sub shell
  - (c) It has completely filled d-sub shell
  - (d) It has two electrons in the outer most shell
- (ix) Ethanol and Methoxy methane are best considered:
  - (a) Position isomers
  - (b) Chain isomers
  - (c) Metamers
  - (d) Functional group isomers
- (x) This is used as anti knocking agent:  $\rightarrow$  tetraethyl lead
  - (a)  $\text{Pb}(\text{CH}_3)_2$
  - (b)  $\text{Pb}(\text{C}_2\text{H}_5)_2$
  - (c)  $\text{Pb}(\text{CH}_3)_4$
  - (d)  $\text{Pb}(\text{C}_2\text{H}_5)_4$
- (xi) This is ortho-para directing group:  $\rightarrow$  lone pair of  $e^-$ 
  - (a)  $-\text{NO}_2$
  - (b)  $-\text{NH}_2$
  - (c)  $-\text{CHO}$
  - (d)  $-\text{COOH}$
- (xii) When Sodium acetate reacts with Soda lime, it forms Sodium carbonate and:  $\text{CH}_3\text{COONa} + \text{NaOH}$ 
  - (a)  $\text{CO}_2$
  - (b)  $\text{CH}_3\text{COOH}$
  - (c)  $\text{CH}_3\text{OH}$
  - (d)  $\text{CH}_4$
- (xiii) When Methyl magnesium iodide reacts with Formaldehyde, it gives:
  - (a) Ethane
  - (b) Ethene
  - (c) Ethanol
  - (d) Acetic acid
- (xiv) It is used as a preserving agent for biological specimen:
  - (a) Methanol
  - (b) Ethanol
  - (c) Acetaldehyde
  - (d) Formalin  $\rightarrow 40\%$  form aldehyde
- (xv) A dipolar charged but overall an electrically neutral-ion is called:  $\text{CH}_3\text{NH}_3^+$ 
  - (a) Zwitter ion
  - (b) Carbonium ion
  - (c) Hydronium ion
  - (d) Oxonium ion
- (xvi) The making of design on glass surface by using HF is called:  $\text{CH}_3\text{COOH}$ 
  - (a) Galvanizing
  - (b) Bleaching
  - (c) Etching
  - (d) Silvering of glass
- (xvii) When Carboxylic acid reacts with alcohol, it produces a new class of compound called:
  - (a) Ether
  - (b) Ester
  - (c) Amide
  - (d) Acid halides



*Ammonium tetrathioarsenate (III)  
Sodium pentacyano ferrate (III)*

## SECTION "B" (SHORT ANSWER QUESTIONS) (36-Marks)

NOTE: Attempt Any NINE questions. Atleast FOUR questions from INORGANIC CHEMISTRY and FOUR questions from ORGANIC CHEMISTRY. All questions carry equal marks.

### INORGANIC CHEMISTRY

Q. 2(i) Refer to the list of given compounds:

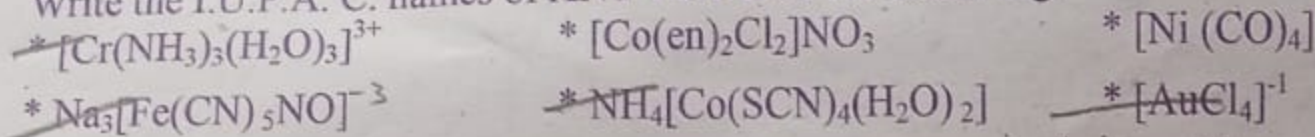
Compound	A	B	C	D
Specific Name	Epsom salt	Carnallite	Sandhur	Hypo

- (ii) \* Write equation for the action of AgBr on D. \* Write any one use of A.  
\* Write the equation for the preparation of C. \* Write the formulae of A and B.  
Define periods and groups. Give the valence shell configuration of the following:  
\* Alkali metals and Coinage metals \* Group IV-A and IV-B

OR

- (a) State the following: \* Döbereiner's law of Triads \* Newland's Law of Octaves  
(b) Identify the block, group and period of elements having atomic number:  
\* 29 \* 34

(iii) Write the I.U.P.A. C. names of ANY FOUR of the following:



- (iv) (a) Write two methods for the preparation of Water gas. *tetrachloroaurate (III)*  
(b) Give the reaction of Atomic Hydrogen with: \* Oxygen \* Silver chloride  
(v) Give the preparation of Chlorine gas by Nelson cell.

OR

- (vi) What is matte? How is blister Copper obtained from matte?  
Give the scientific reasons for ANY FOUR of the following:  
\* Alkaline earth metals are strongly hydrated than alkali metals.  
\* Atomic hydrogen is more reactive than molecular hydrogen.  
\* Plastic sulphur is elastic in nature.  
\*  $\text{Li}/\text{Li}^+$  has exceptionally high electrode potential.  
\*  $\text{H}_2\text{O}$  and  $\text{NH}_3$  act as ligand but  $\text{H}_3\text{O}^+$  and  $\text{NH}_4^+$  do not.  
\* Boric acid is soft and slippery.  
\* Zinc hydroxide is soluble in excess of Sodium hydroxide.  
\* Graphite conducts electricity while diamond does not.

OR

- (vii) What are isotopes? Explain the different isotopes of Hydrogen.  
Write the balanced chemical equations for ANY FOUR of the following reactions:  
\* Coleminite reacts with soda ash. \* Soda ash is fused with silica.  
\* Carbon reacts with conc. Sulphuric acid. \* Super heated water reacts with Boron nitride.  
\* Aluminium reacts with conc. Sulphuric acid. \* Phosphorus reacts with Conc. Nitric acid.  
\* Carbon monoxide reacts with Chlorine gas. \* Saturated solution of Soda ash with Carbon dioxide.  
\* Chromium oxide reacts with Potassium hydroxide and Bromine water.

OR

Describe ANY TWO of the following general properties of d-block elements:

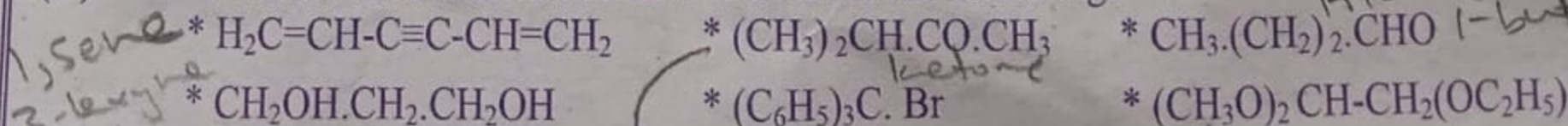
- \* Interstitial Compounds \* Magnetic properties \* Colour \* Catalytic properties

### ORGANIC CHEMISTRY

(viii) Define ANY FOUR of the following:

- \* Rancidification \* Peptide bond \* Metamerism \* Glycosidic linkage  
\* Catenation \* Polymerization \* Saponification \* Homologous series

(ix) Write I.U.P.A.C. names of ANY FOUR of the following:



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- (x) Draw hybrid orbital structure of Ethylene. How are the following compounds obtained from Ethylene? \* Mustard gas \* Ethylene glycol

OR

Consider the following structure and answer the following questions:



(A)



(B)

- \* Draw the hybrid orbital structure of A.
- \* Write the equations for the conversion of B into Maleic anhydride.
- \* Give equation for the preparation of B from A.
- (xi) Give stepwise mechanism of Nitration OR Chlorination in Benzene.
- (xii) How could you prepare ANY FOUR of the following compounds?
  - \* Ter-butyl alcohol from Grignard reagent
  - \* Oxalic acid from Acetylene
  - \* Oxime from Formaldehyde
  - \* Ethane from Chloro ethane
  - \* Nylon-6, 6 from Adipic acid
  - \* Vinegar from Grignard reagent
- (xiii) Distinguish ANY TWO of the following compound by simple chemical test:
  - \* Formaldehyde and Acetone
  - \* Ethane and Ethyl chloride
  - \* 1-Butyne and 2-Butyne
  - \* n-Hexane and Benzene
- (xiv) Give the classification of Organic compounds.

OR

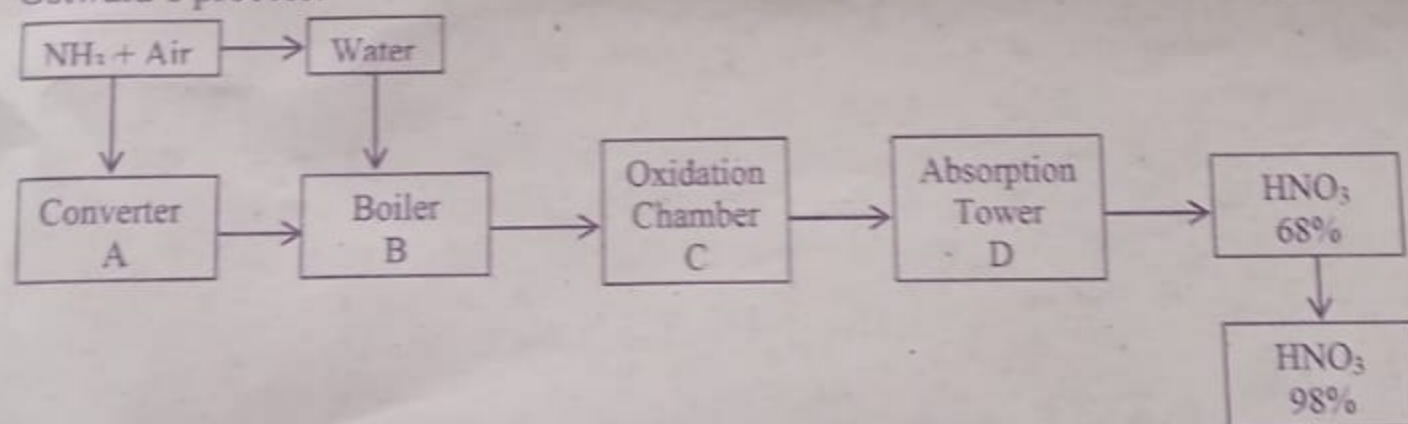
Write only the equations for the following reactions:

\* Wurtz reaction \* Cannizzaro reaction \* Williamson's synthesis \* Dow's process

### SECTION "C" (DETAILED ANSWERS QUESTIONS) (32-MARKS)

**Note:** Attempt Any TWO questions. ONE question from INORGANIC CHEMISTRY and ONE question from ORGANIC CHEMISTRY. Both questions carry equal marks.

- Q.3(a) The flow chart represents stages in the manufacture of Nitric acid ( $\text{HNO}_3$ ) by Ostwald's process. (6)



- \* Explain the process in 'A' along with conditions for maximum conversion.
- \* Describe the process in 'C' and 'D'.
- \* How is 98%  $\text{HNO}_3$  obtained?
- \* Draw the structure of Nitric acid in vapour phase.

OR

Give the manufacturing of Sulphuric acid by Contact process. Also mention the conditions to get maximum yield of  $\text{SO}_3$ . Draw flow sheet diagram.

- (b) How is Caustic soda manufactured by Castner-Kellner cell? Write the advantages and disadvantages of Castner-Kellner cell. (Diagram is not required) (5)

OR

How is Soda-ash manufactured by Ammonia - Solvay's process? (Flow-sheet diagram is not required)

- (c) State Modern periodic law. Describe the types of elements in the periodic table based on electronic configuration. (5)

OR

Write only the equations, when the following compounds are heated:

\*Potassium permanganate \*Blue stone \*Lunar caustic \*Gypsum \*Ortho boric acid



- Q.4 (a) What is metallurgy? How is 99.99 % pure Aluminium obtained from Bauxite ore containing  $\text{SiO}_2$  as major impurities? (6)
- (b) Complete and balance ANY FIVE of the following equations: (5)
- |   |  |
|---|--|
| $\text{K}_2\text{MnO}_4 + \text{Cl}_2 \longrightarrow$  | $\text{HCOOH} + \text{H}_2\text{SO}_4 \xrightarrow{\text{conc}}$ |
| $\text{Al} + \text{NaOH} + \text{H}_2\text{O} \longrightarrow$                                | $\text{AgNO}_3 + \text{NH}_3 \xrightarrow{\text{excess}}$        |
| $\text{FeO} \cdot \text{Cr}_2\text{O}_3 + \text{K}_2\text{CO}_3 + \text{O}_2 \longrightarrow$ | $\text{CuSO}_4 + \text{KI} \longrightarrow$                      |
| $\text{FeCl}_3 + \text{H}_2\text{S} \longrightarrow$  | $\text{K}_2\text{CrO}_4 + \text{H}_2\text{SO}_4 \longrightarrow$ |
| $\text{K}_2\text{Cr}_2\text{O}_7 + \text{KCl} + \text{H}_2\text{SO}_4 \longrightarrow$        | $\text{Sb}_2\text{S}_3 + \text{HCl} \longrightarrow$             |
- (c) Write short notes on ANY TWO of the following: (5)
- \* Bleaching powder
  - \* Extraction of Sodium metal
  - \* Lead Pigments
  - \* Silvering of mirror
  - \* Crystalline forms of Sulphur
  - \* Corrosion and its prevention

OR

What are hydrides? Give their classification? Explain Ionic hydrides.

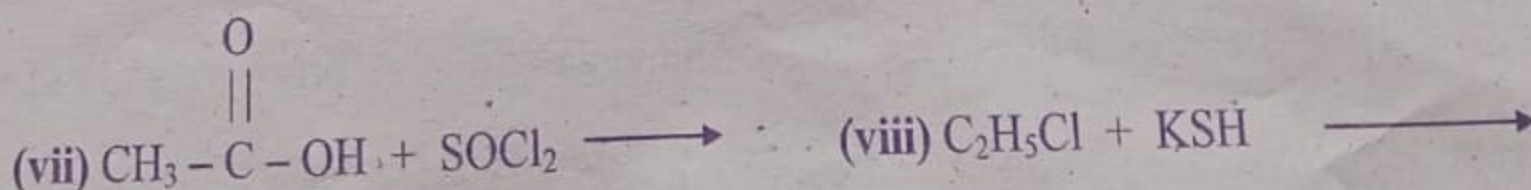
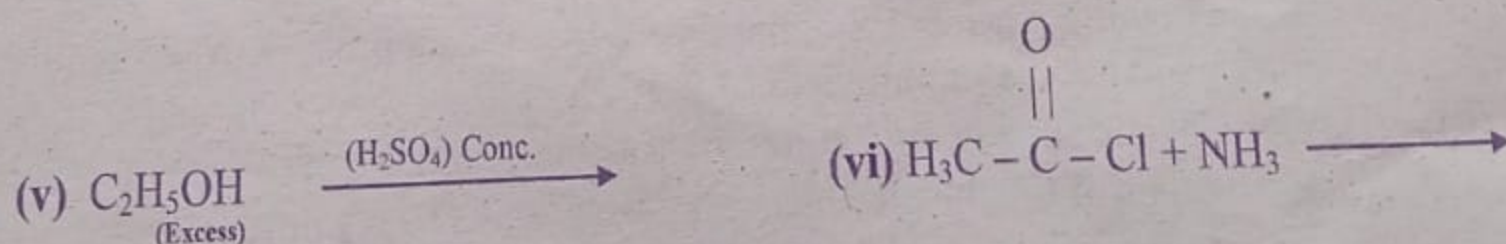
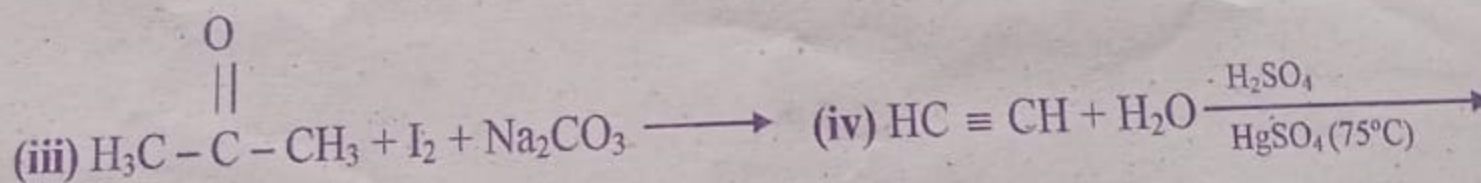
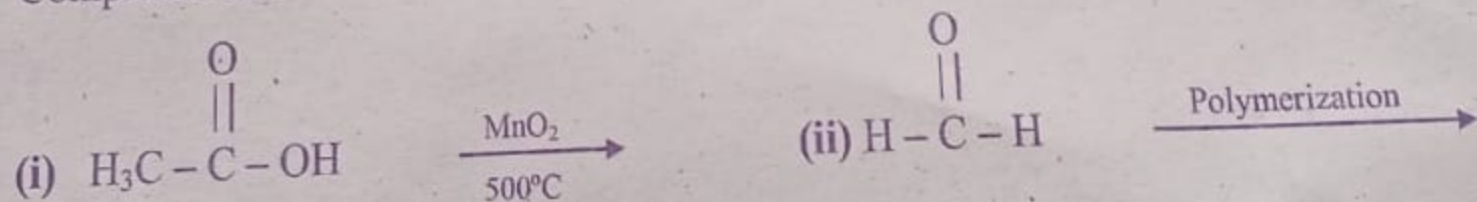
### ORGANIC CHEMISTRY

- Q. 5 (a) Explain the structure of Benzene by Molecular Orbital Treatment. Also discuss the stability of Benzene. (6)
- OR
- Describe the structure of Benzene suggested by Kekulé. What are the objections against it? How were these objection removed? (5)
- (b) Give the structures of ANY FIVE of the following: (5)
- \* Catechol
  - \* Nicotin amide
  - \* Diphenyl acetylene
  - \* Picric acid
  - \* Valeric acid
  - \* Iso-butyl alcohol
  - \* Terephthalic acid
  - \* Di-isopropyl ether
  - \*  $\alpha, \beta$  - dimethyl butyraldehyde
- (c) What is photochemical reaction? Explain the mechanism with the example of Chlorination of Methane. (5)
- Q. 6(a) Give the classification of Monohaloalkanes. Explain the following reactions with mechanism when: (6)
- (i)  $\text{NaCN}$  reacts with 2-chloro-2-methyl propane
- (i)  $\text{NaOH}$  reacts with chloro ethane.

OR

What is fermentation? How is Ethanol prepared by the fermentation of Molasses and Starch? Write the composition of Rectified spirit and Denatured alcohol.

- (b) Complete and balance ANY FIVE of the following reactions: (5)



- (c) Write short notes on ANY TWO of the following: (5)

- \* Fertilizers
- \* Plastics
- \* Elimination reactions
- \* Carbohydrates
- \* Vitamins
- \* Amino acids



(iii) Write the I.U.P.A.C. names of ANY FOUR of the following:

~~\*  $[\text{Cr}(\text{NH}_3)_3(\text{H}_2\text{O})_3]^{3+}$~~       \*  $[\text{Co}(\text{en})_2\text{Cl}_2]\text{NO}_3$       \*  $[\text{Ni}(\text{CO})_4]$   
~~\*  $\text{Na}_3[\text{Fe}(\text{CN})_5\text{NO}]^{-3}$~~       \*  $\text{NH}_4[\text{Co}(\text{SCN})_4(\text{H}_2\text{O})_2]$       ~~\*  $[\text{AuCl}_4]^{-1}$~~

$[\text{Co}(\text{NH}_3)_3(\text{H}_2\text{O})_3]^{+3}$  → tri ammine tri aqua chromium (III) ion

$[\text{Co}(\text{en})_2\text{Cl}_2]^{+2}\text{NO}_3^{-1}$  → dichlorobis ethylenediamine cobalt (III) nitrate

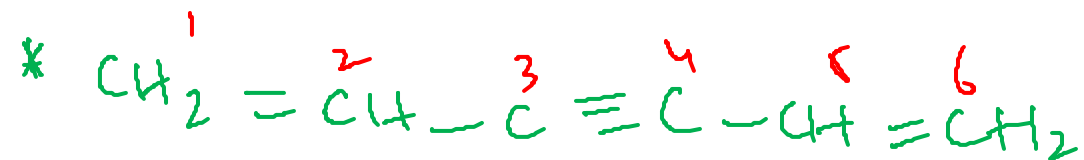
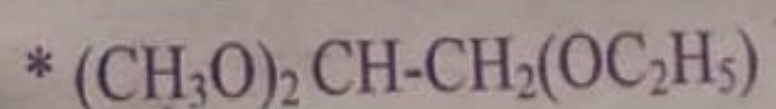
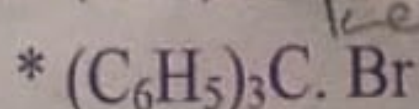
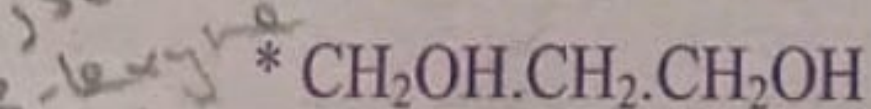
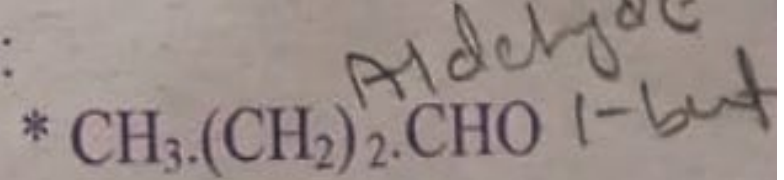
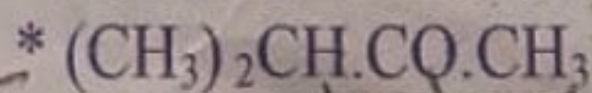
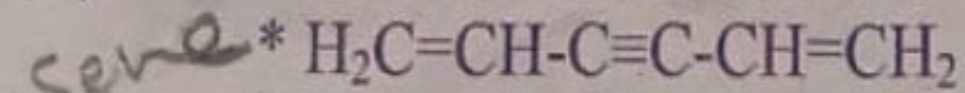
$[\text{Ni}(\text{CO})_4]$  → tetracarbonyl nickel (0)

$\text{Na}_3^{+3}[\text{Fe}^{+2}(\text{CN})_5^{+5}\text{NO}^{-1}]^{-3}$  → sodium pentacyanonitrosyl ferrate (II)

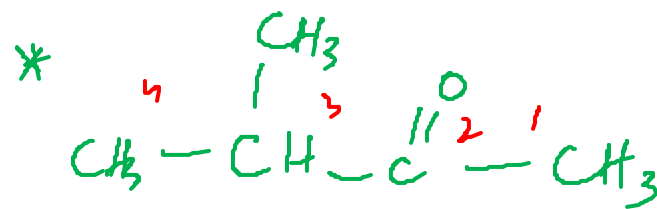
$\text{NH}_4^{+1}[\text{Co}^{+3}(\text{SCN})_4^{+4}(\text{H}_2\text{O})_2^0]$  → ammonium diaqua tetrathiocyanate cobaltate (III)

$[\text{AuCl}_4]^{-4}$  → tetrachloro aurate (III) ion

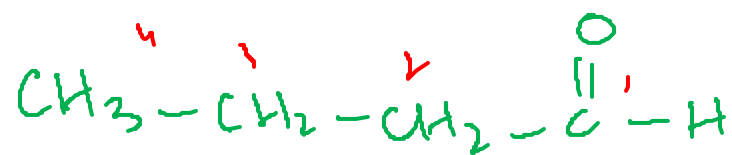
(ix) Write I.U.P.A.C. names of **ANY FOUR** of the following:



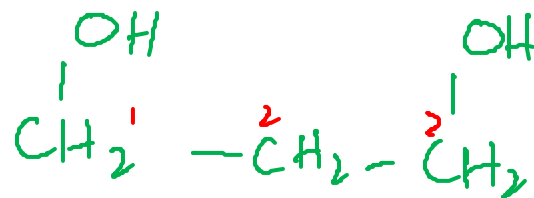
hex-1,5-diene-3-yne



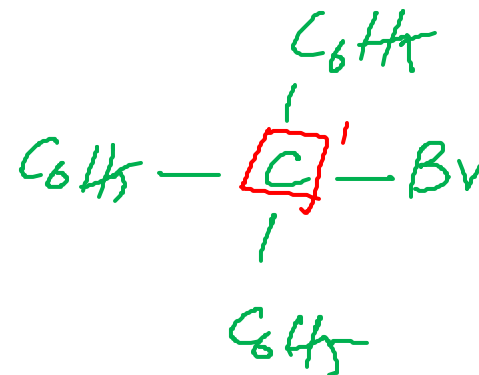
3-methylbutan-2-one



butan-1-al



propane-1,3-diol



1-ethoxy-2,2-dimethoxy ethane

~~1-bromo-1,1,1-triphenyl methane~~

against it: How can we protect it?  
(b) Give the structures of ANY FIVE of the following:

\* Catechol

\* Picric acid

\* Terephthalic acid

\* Nicotin amide

\* Valeric acid

\* Di-isopropyl ether

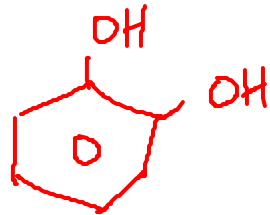
\* Diphenyl acetylene

\* Iso-butyl alcohol

\*  $\alpha, \beta$  - dimethyl butyraldehyde

Explain the mechanism with the example of

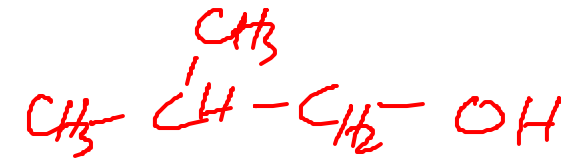
\* Catechol



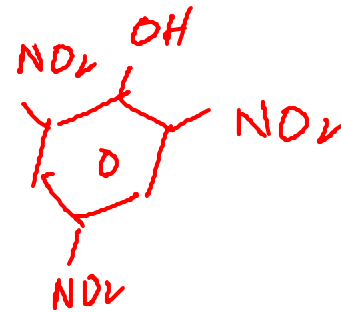
\* Valeric Acid



\* isobutyl alcohol



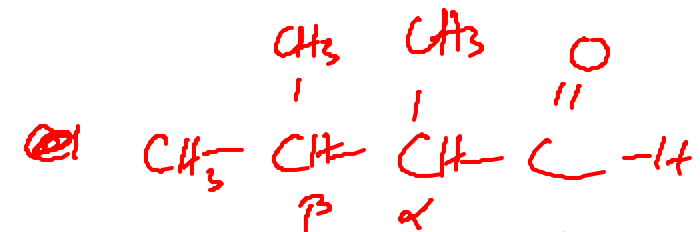
\* Picric Acid



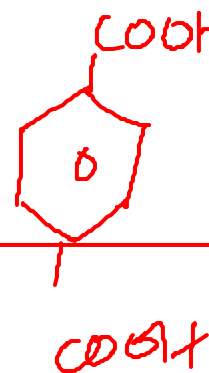
\* di-isopropyl ether



\*  $\alpha, \beta$  - dimethyl butyraldehyde



\* Terephthalic acid

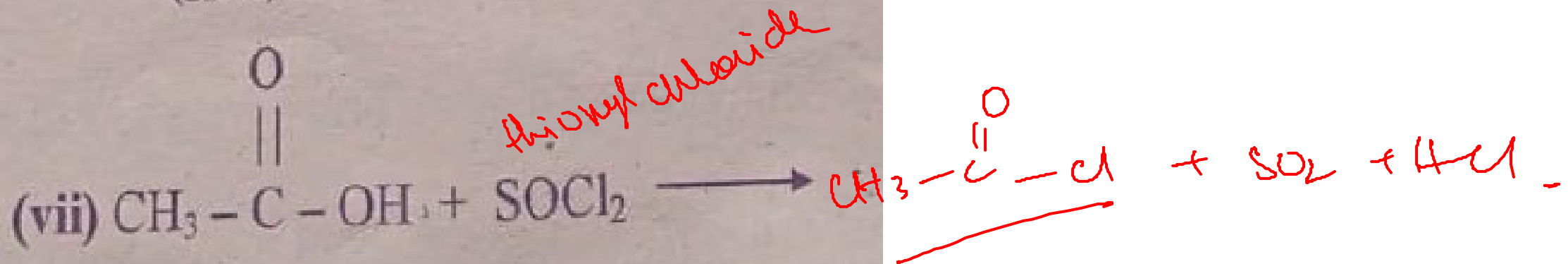
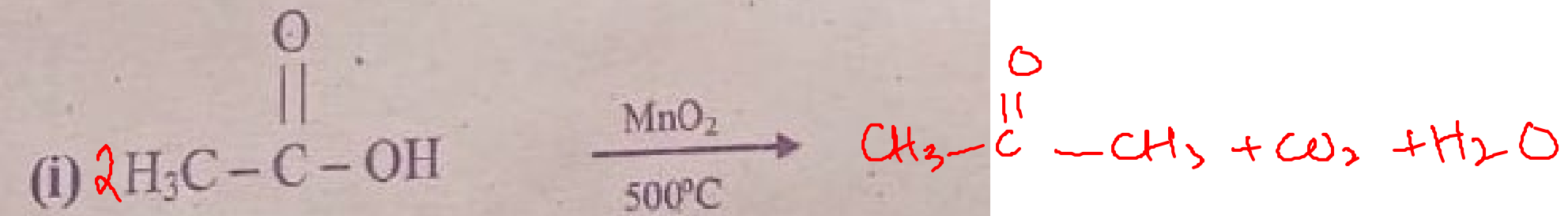


\* diphenyl acetylene

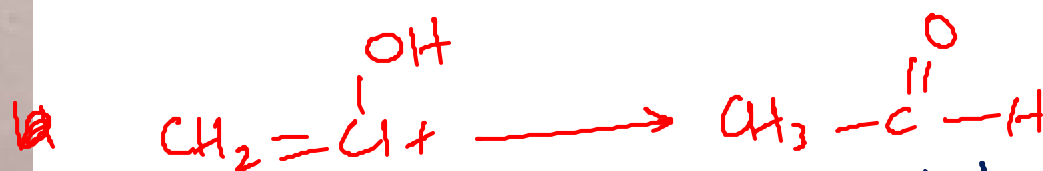
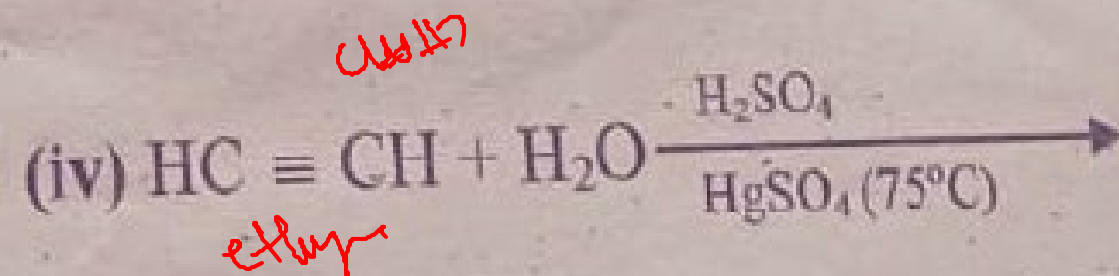
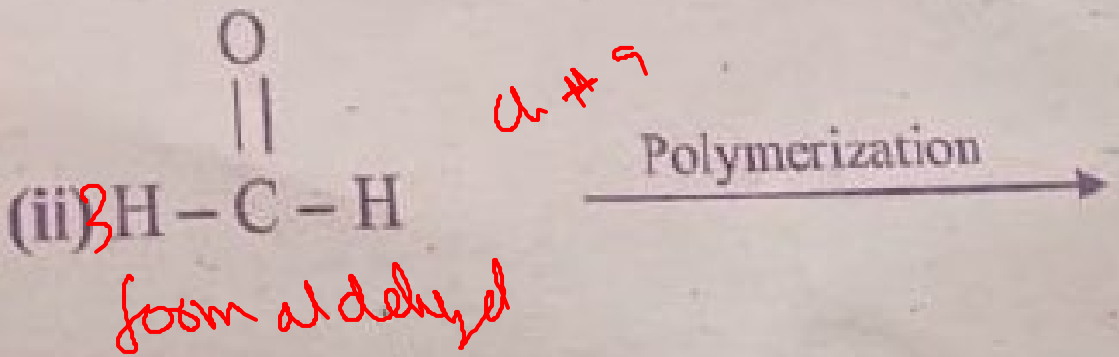


Nicotin amide

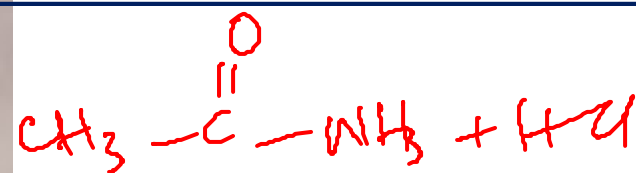
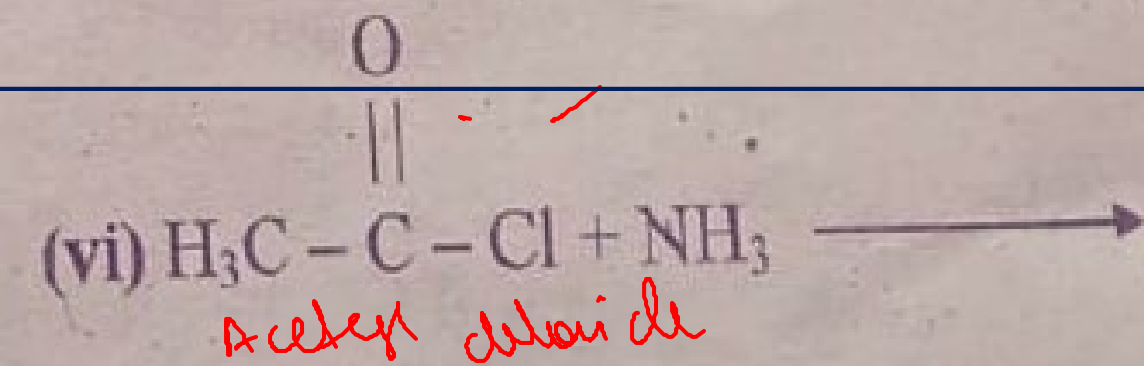








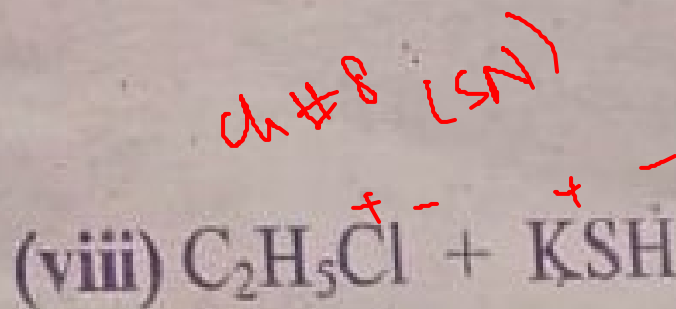
Best of Luck!  
PC-2023



Acetamide

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(Dua-eilm)